REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-20 are presently active in this case. The present Amendment amends Claims 1, 6, 11-12 and 15-16 without introducing any new matter.

The outstanding Office Action objected to the Title because of informalities. Claims 1, 6, 11 and 16 were rejected under 35 U.S.C. §103(a) as unpatentable over <u>Negrelli et al.</u> (U.S. Patent No. 5,712,895, herein "<u>Negrelli</u>") in view of <u>Strobel</u> (U.S. Patent No. 6,650,724). Claims 2-5, 7-10, 12-15 and 17-20 were rejected under 35 U.S.C. §103(a) as unpatentable over <u>Negrelli</u>, <u>Strobel</u> and further in view of <u>Vining</u> (U.S. Patent No. 5,782,762).

In response to the objections to the Title, the Title is amended to be more descriptive. The changes to the Title find non-limiting support in Applicant's specification at page 1, lines 8-12, and therefore do not raise a question of new matter.

To clarify Claim 1, this claim is amended to recite "a second subtracting unit configured to generate mask volume data by subtracting the second volume data from the first volume data." This feature finds non-limiting support in the disclosure as originally filed, for example at page 5, lines 4-6 and at page 14, lines 11-25 and in corresponding Figure 7. Independent Claim 11 is amended to recite "a control unit configured to store the synthetic image in the storage unit," instead of the display unit, and finds non limiting support in Applicant's specification at page 4, lines 12-25, and in corresponding Figure 1. Dependent Claims 12 and 15 are amended to be in accordance with the changes to independent Claim 11.

In light of the amendments to independent Claims 1 and 11, Applicant respectfully requests reconsideration of the rejection under 35 U.S.C. §103(a), and traverses the rejection, as discussed next.

Briefly recapitulating, Applicant's Claim 1 relates to a 3D image processing apparatus including *inter alia*: a first subtracting unit configured to generate data of a plurality of subtraction images by subtracting the plurality of mask images from the plurality of contrast images; a reconstruction unit configured to reconstruct first volume data from the plurality of mask images and reconstructs second volume data from the plurality of subtraction images; a *second subtracting unit* configured to generate mask volume data *by subtracting the second volume data from the first volume data*; an image processing unit configured to generate data of a first 3D image representing a bone structure and/or a soft tissue structure from the mask volume data, and configured to generate data of a second 3D image representing a contrasted blood vessel from the second volume data. Independent Claim 11 recites similar features.

As explained in Applicant's specification from page 1, line 27, to page 2, line 2, Applicant's Claim 1 improves upon background 3D image processing apparatuses, because it can separate blood vessels from the bones clearly, and can display the blood vessels in high definition.

Turning now to the applied references, Negrelli discloses a rotational digital subtraction angiography system, wherein a test phantom is used for a calibration procedure.[1] Negrelli further explains that the calibration system includes a subtraction circuit for generating a subtracted image between the forward sweep rotation image and the corresponding reverse sweep rotation image.[2] Negrelli, however, fails to teach or suggest the Claim 1 first *and second* subtraction units. In particular, Negrelli fails to teach the second

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[1] See Negrelli at column 1, lines 5-12 and lines 55-67.
[2] See Negrelli at column 2, lines 55-60, from column 5, line 66, to column 6, line 2, and in Figure 1, item 86.

subtracting unit configured to generate mask volume data by subtracting the second volume

data from the first volume data. As can be seen in Negrelli's Figure 1, there is only *one*

subtraction unit that performs substation on *projection images*.

Applicant also respectfully submits that Strobel fails to remedy the deficiencies of

Negrelli. Strobel describes a 3D angio-volume reconstruction method for a three-

dimensional subject based on 2D projection exposures.[3] Strobel teaches that angio-volume

data set V_1 (based on mask images) is added to fill volume data set V_2 (based on fill images),

thereby eliminating an ultimate volume data set V_E without any shadowing artifacts.[4] Strobel

also explains that difference volume data set V_2-V_1 is generated to produce segmenting of the

vessel tree.[5] However, Strobel fails to teach or suggest a second subtracting unit configured

to generate mask volume data by subtracting the second volume data from the first volume

data, wherein the first volume data is reconstructed from the plurality of contrast images and

the second volume data is reconstructed from the plurality of subtraction images, as recited in

Applicant's Claims 1 and 11. An angio-volume data set V_1 based on 2D mask images, as

taught by Strobel, *is not* a first volume data reconstructed from the plurality of contrast

images, as recited in independent Claims 1 and 11.

Therefore, even if the combination of Negrelli and Strobel is assumed to be proper,

the combination fails to teach every element of the claimed invention. Specifically, the

combination fails to teach the claimed first and second subtraction units. Accordingly,

Applicant respectfully traverses, and requests reconsideration of, the rejection of Claims 1

and 11 based on these patents.[6]

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[3] See Strobel in the Abstract.
[4] See Strobel from column 1, line 52, to column 2, line 30.
[5] See Strobel at column 2, lines 9-11.
[6] See MPEP 2142 stating, as one of the three "basic criteria [that] must be met" in order to establish a *prima facie* case of obviousness, that "the prior art reference (or references when combined) must teach or suggest all the claim limitations," (emphasis added). See also MPEP 2143.03: "All words in a claim must be considered in judging the patentability of that claim against the prior art."

To clarify independent Claims 6 and 16, these claims are amended to recite "a calibration unit configured to calibrate the plurality of mask images and the plurality of contrast images by using vertically and horizontally arranged lines forming a lattice as a calibration image." This feature finds non-limiting support in Applicant's specification as originally filed, for example at page 7, lines 5-18 and in corresponding Figure 3B.

In light of the amendments to independent Claims 6 and 16, Applicant respectfully requests reconsideration of the rejection under 35 U.S.C. §103(a), and traverses the rejection, as discussed next.

Negrelli describes a calibration system and method that includes the use of a test phantom, wherein the test phantom includes a gauge with "a plurality of x-ray opaque vertical indicia partially encircling the block, an x-ray opaque element located at an isometric center of the block and a plurality of x-ray opaque horizontal indicia radiating at an angular displacement from one another."[7] The gauge is shown in Figure 2. Accordingly, Negrelli fails to teach or suggest the calibration unit configured to calibrate the plurality of mask images and the plurality of contrast images by using vertically and horizontally arranged lines *forming a lattice* as a calibration image, as recited in independent Claims 6 and 16. Negrelli's gauge clearly does not form a lattice. The reference Strobel is entirely silent on a calibration feature.

Therefore, even if the combination of Negrelli and Strobel is assumed to be proper, the combination fails to teach every element of the claimed invention. Specifically, the combination fails to teach the claimed calibration unit with a lattice as a calibration image. Accordingly, Applicant respectfully traverses, and requests reconsideration of, the rejection of Claims 6 and 16 based on these patents.[8]

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[7] See Negrelli from column 1, line 62 to column 2, line 2.

[8] See MPEP 2142 stating, as one of the three "basic criteria [that] must be met" in order to establish a *prima facie* case of obviousness, that "the prior art reference (or references when combined) must teach or suggest all the claim limitations," (emphasis added). See also MPEP 2143.03: "All words in a claim must be considered in

The reference <u>Vining</u>, relied upon by the outstanding Office Action to form a 35 U.S.C. §103(a) rejection of the dependent claims, does also not remedy the deficiencies of <u>Negrelli</u> and <u>Strobel</u>. <u>Vining</u> is merely concerned with 3D graphics rendering for selected body organs,[9] and does not teach or suggest anything regarding a first and second subtraction unit (Claims 1 and 11) or a calibration unit (Claims 6 and 16). Therefore, Applicant respectfully traverses the rejection of the dependent claims, and requests reconsideration of the rejection.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. A Notice of Allowance for Claims 1-20 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicant's undersigned representative at the below listed telephone number.

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judging the patentability of that claim against the prior art."
[9] See <u>Vining</u> in the Abstract.

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